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Data Paper

Floristic composition in ecotone forests in northern Brazilian Amazonia: preliminary data

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Abstract

Background

Ecotone has been defined as "*a multi-dimensional environmentally stochastic interaction zone between ecological systems with characteristics defined in space and time, and by the strength of the interaction*" (Hufkens et al. 2009). This is a known concept to define transitional zones between two or more ecological communities, ecosystems or biotic regions. Ecotone forests, dispersed in northern Brazilian Amazonia, are natural formations which have been largely affected by anthropogenic impacts, such as deforestation and fire. Maracá Ecological Station, State of Roraima, Brazil, is a protected area with extensive representations of ecotone forests in this region of the Amazonia. Forest inventories and floristic surveys are important as they extend our knowledge (1) of forest structure and tree species composition and (2) of tree and palm species ecology in this region of the Amazonia. Both improve our ability to predict changes in plant diversity, considering the

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future scenarios of climate change in comparison with previous surveys performed in Maracá.

New information

We present a forest inventory carried out in 129 plots (10 m x 50 m; 6.45 ha in total) dispersed in a grid (5 km x 5 km) located in a forest zone ecotone in the eastern part of Maracá Ecological Station. All stems (tree + palm) with diameter at breast height ≥ 10 cm were recorded, identified and measured. A total of 3040 stems were recorded (tree = 2815; palm = 225), corresponding to 42 botanic families and 140 identified species. Seven families and 20 genera contained unidentified taxa (12.2%). Sapotaceae (735 stems; 10 species), Leguminosae (409; 24) and Rubiaceae (289; 12) were the most abundant families. *Peltogyne gracilipes* Ducke (Leguminosae), *Pradosia surinamensis* (Eyma) T.D.Penn. (Sapotaceae) and *Ecclinusa guianensis* Eyma (Sapotaceae) were the species with the highest importance value index (~ 25%). The dominance (m^2 ha^{-1}) of these species corresponds to > 36% of the total value observed in the forest inventory. Our dataset provides complementary floristic and structure information on tree and palm in Maracá, improving our knowledge of this Amazonian ecotone forest.

Keywords

Amazon, Brazil, forest inventory, Maracá Island, palms, Roraima, tree species

Introduction

The Pan-Amazon or Continental Amazon has the largest tropical forest area on the planet with > 6 million km^2 (MapBiomas 2019, WWF 2019). Estimates based on > 1,100 permanent plots scattered throughout the region indicate that the tree richness ranges between 7-10,000 species occupying a great diversity of habitats (Cardoso et al. 2017, ter Steege et al. 2019). Brazilian Amazonia accounts for the largest physical area of this region (Salati and Vose 1984; > 5 x 10^6 km^2). However, it has been long threatened by a series of anthropogenic impacts, such as the replacement of native forest by pasture and soybean planting (Almeida et al. 2016, Fearnside 2006), combined with an increase in burned areas of primary and secondary forests (Alencar et al. 2015, Aragão et al. 2018, Barni et al. 2015). Modern anthropogenic activities, associated with global warming, have a negative effect on tree diversity and reduce the conservation status of Amazonian forests (Barlow et al. 2016, Esquivel-Muelbert et al. 2019). Despite having large areas of ombrophilous forests, the ecotone forests are important ecological areas because they occupy the peripheral zone to the Amazon basin (Central Amazonia) and are considered as the forest formations most impacted by anthropogenic activities in the Southern (Marques et al. 2019, Nogueira et al. 2015) and Northern (Barni et al. 2015, Santos et al. 2013) Amazonian "arcs of deforestation". The accelerated increase of anthropogenic

activities within the Amazonian ecotones has been a major contributor to the fact that the region as a whole is now approaching to the "tipping point", limiting forest growth and potentially favouring low-density environments when compared to those currently supported by the region (Lovejoy and Nobre 2018).

Several floristic surveys and forest inventories have been carried out in these peripheral regions, especially from 1980-1990 (Nelson and Oliveira 2001). However, this period was insufficient to accumulate realistic information on forest structure and floristic in view of the continuous advance of anthropogenic activities. This impedes the reliable characterisation of plant diversity in these peripheral Amazonian regions. One such area is the State of Roraima, located in the northern part of the Brazilian Amazonia. This ~225,000 km^2 area contains ecotone forest zones of great geoecological importance because they are located between Guiana Shield (highland savannas and tropical dry forests) and Central Amazonia (lowland tropical forests) (Barbosa and Bacelar-Lima 2008, Oliveira et al. 2017), which gives them a unique phytogeographical and ecoevolutionary history, where a high degree of endemism is observed and unique vegetation sets exist (Nascimento and Proctor 1997, Milliken and Ratter 1998). However, the region has received few forest inventories and floristic surveys (Suppl. material 1); main of them are associated with the monodominant forests (Nascimento and Proctor 1997, Nascimento et al. 1997), campinas and campinaranas (Barbosa and Ferreira 2004, Damasco et al. 2013) and forest fragments dispersed in savannas (Sette-Silva 1993, Santos et al. 2013, Jaramillo 2015).

In an attempt to expand studies on plant diversity in this part of the Amazon, two PPBio (Biodiversity Research Program, https://ppbio.inpa.gov.br) 25-km^2 research grids were installed in areas defined as ecotone forests in Roraima taking into account the Brazilian Vegetation Classification System (Brazil-IBGE 2012): Maracá Ecological Station and Viruá National Park. Both are protected areas under Brazilian government management. Surveys of structure (vertical and horizontal) and tree species composition of the main forest types of these research grids have been expanded in Maracá (Nascimento et al. 2014, Nascimento et al. 2017, Villacorta 2017) and Viruá (Damasco et al. 2013, Barbosa et al. 2017). Accordingly, the current study provides preliminary data from a forest inventory carried out in the Maracá research grid. These data expand the scale of floristic and structural observations in this northern Amazonian ecotone zone from those initiated by Milliken and Ratter (1998) and Nascimento et al. (1997).

Project description

Title: "*Tree growth and mortality in Roraima ecotonal forests*" (Crescimento e mortalidade de árvores em florestas ecotonais de Roraima). The dataset is associated with the PhD thesis of Williamar Rodrigues Silva (Analysis of environmental conditions and climate variability on tree growth and mortality in ecotonal forests of Maracá Island, Roraima), PRONAT/UFRR, Boa Vista, Roraima, Brazil.

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